

A MODEL OF THE RELATIONSHIP BETWEEN REGULATED AND UNREGULATED FINANCIAL MARKETS: CREDIT RATIONING IN JAPANESE CONTEXT†

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For an initially capital scarce economy, credit allocation through direct government regulation appears to be an attractive strategy. Almost all rapidly developing economies adopt some measures to allocate funds to particular sectors or industries through direct government regulations. Although this method of financing is certainly effective in affecting the allocation of funds, it is quite detrimental to economic development if applied to the entire field of financial activities. This is because overall government regulation prevents the working of the competitive market forces, regarding the spontaneous development of financial markets. Moreover, the potential for arbitrary regulation is liable to lead to a serious misallocation of resources. Therefore, for the sake of sound development, direct government intervention should be limited to certain segments of financial markets, the rest being left to the more or less free play of market forces.

One important problem in this respect is the relationship of the regulated and the unregulated markets. If the unregulated markets allocate funds independently of or in the opposite direction to the regulated market, the net effect of direct governmental allocation on the entire economy would be offset. If the unregulated market works in the same direction as the regulated market, the overall effect of regulation is stronger than its immediate effect, and policymakers should take this into account.

The purpose of this paper is to examine the relationship of regulated and unregulated financial markets in the postwar Japanese economy. In postwar Japan, the allocation of long-term outside funds such as stocks, corporate bonds and long-term loans has been more or less under strict government regulations, and preferentially given to big businesses, most of which produce investment and export goods. On the other hand, short-term bank loans, on which Japanese businesses are heavily dependent, are supplied in a relatively free market without any governmental regulation on their allocation.¹ Nevertheless, as will be shown

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¹ The sole regulation on this market has been the imposition of ceiling rates on the nominal rate of interest. However, it is recognized that this regulation has been virtually ineffective owing to the widely prevailing custom of compensating deposits. This fact is officially admitted by the recent progress report of Kinyu Seido Chosakai (Investigating Committee on Financial System) of the Ministry of Finance.

below, the market of short-term bank loans has allocated funds preferentially, both in terms of interest rates and amount of loans, to big businesses in conformity with the regulated long-term funds markets. This suggests the existence of strong influence from the regulated long-term funds markets to the unregulated short-term bank loan market. The basic structure of our model is as follows.

Because of low interest policy and because of relative scarcity of supply of long-term funds, there is perpetual excess demand in long-term funds markets, and funds in these markets are preferentially rationed to large businesses. As a result, the realized amount of long-term funds is generally insufficient for financing fixed investments of businesses, and the degree of insufficiency is more severe for smaller businesses. Businesses are obliged to use short-term bank loans as substitutes for long-term funds.

The short-term bank loans market, on the other hand, is a bilateral monopoly market between an individual business and an individual bank, where equilibrium is determined on the basis of the market power of two transactors. Since smaller businesses have meager access to long-term funds, their necessity for financing fixed investment in the short-term bank loans market is urgent and, consequently, their market power in the short-term bank loans market is relatively weak. Therefore, equilibrium in the market is attained at a point relatively close to the monopolist equilibrium of the bank. Larger businesses, on the other hand, have relatively ample access to long-term funds, and their market power in the short-term bank loans market is relatively strong. As a result, equilibrium is attained at a point relatively close to the monopsonistic equilibrium of the business.

We assume that market power of business in the short-term loan market is a function of relative access to long-term funds, so that it changes as the availability of long-term funds varies. By introducing a lag in the effect of the change in market power, we can infer cyclical movements of short-term loans to small and large businesses.

Section I presents some evidence on the excess demand and credit rationing in the long-term funds markets, and suggests the existence of effect into the short-term loans market. Section II gives a theoretical underpinning to the bilateral monopoly model of the short-term bank loans market, and examines the difference of the solution between small and large businesses. Section III questions the empirical validity of the model, examining the cyclical movements of such variables as loan share of small businesses or long-term outside funds fixed investment ratio. Finally, section IV examines the relevance of the model to the problem of dualism and the relationship to the model of credit rationing of Dwight Jaffee and Franco Modigliani.

I. *Long-term Funds Markets and Short-term Bank Loans Market*

A. *Characteristic of Corporate Financing in Postwar Japan*

Table 1 shows shares of sources and uses of corporate funds in Japan as well as in the United States during 1963–1967, with Japan classified by size of firms. From this, we can derive two important features of corporate financing in Japan.

The first characteristic comes from a comparison of sources of funds between Japan and the United States. By comparing column (3) and (4) we can see that:

- (i) Retained earnings comprise a very small portion of the source of funds of Japa-

TABLE 1. PERCENTAGE COMPOSITION OF CORPORATE FINANCING AND INVESTMENTS (1963-67)

	Japan			U.S.A.
	Large Business (1)	Small Business (2)	Total (3)	(4)
(A) Sources of Funds	100.0	100.0	99.8	100.0
Short-term funds				
(1) Short-term borrowings from financial intermediaries	24.0	19.6	24.4	4.8
(2) Net trade credit	—	30.4	3.6	—
Long-term funds				
(3) Long-term borrowings from financial intermediaries	22.6	11.3	19.6	29.6
(4) Issue of corporate bonds	5.5	0.0	3.6	
(5) Issue of stocks	11.5	5.7	10.0	
(6) Retained earnings	7.8	8.7	8.9	40.9
Others	28.8	24.3	29.7	13.4
(B) Uses of Funds	100.0	100.0	100.0	100.0
(7) Fixed assets investments	51.8	34.7	49.4	57.5
(8) Liquid assets investments other than trade credit	31.4	65.3	50.6	32.9
(9) Net trade credit	16.8	—	—	—
(C) Ratio of long-term outside funds to fixed assets investments $\theta ((3)+(4)+(5))/(8)$	76.4	49.0	67.2	71.1
(D) Ratio of long-term funds to fixed assets investments $((3)+(4)+(5)+(6))/(8)$	91.5	74.1	65.2	142.3

Source: Okurasho, *Hojin Kigyo Tokei Nenpo* and Bank of Japan, *Kokusai Hikaku Tokei (International Financial Statistics)*.

Notes: (1) Average of 1963-67.

(2) For Japan, corporate firms of all industries. Small (large) businesses are with less (more) than 100 millions yen paid-in capital. For USA, manufacturing corporations.

(3) There is a minor change in the number of firms covered during the period, so that figures are approximate ones.

nese corporations and, as a result, they are heavily dependent on the short-term borrowings from financial intermediaries. (There is no significant difference in the share of long-term outside funds such as long-term borrowings, bonds and stocks.)

This is a direct counterpart of the rapid growth process of postwar Japan, in which corporate businesses invested much more than their savings, depending on the borrowings from financial intermediaries whose main source of funds was deposits of households.

The second characteristic concerns the difference between small and large firms. By comparing column (1) and (2), we can obtain the following proposition:

(ii) There is a significant difference in the share of long-term sources of outside funds between small and large business. Moreover, on the trade credit market, large firms are creditors, while small firms are debtors.

The latter part of this proposition is in itself an interesting phenomenon, and has provoked many arguments. Apparently, this is at least partly due to the different availability of funds other than trade credit between large and small firms, so that it has close relationships with our present problem. However, for the sake of simplicity, we neglect this phenomenon in our model, and confine our analysis to direct bank-business relationships. The former part of the proposition (ii) is most important. For small firms, the share of long-term

borrowings and stocks is only half of large firms and, moreover, use of corporate bonds is zero. As a result, their ratio of long-term outside funds to fixed assets investments (hereafter called θ) is very low as compared to large firms. The value of θ is 76.4 and 49.0% for large and small firms respectively. Even if we add retained earnings in the numerator, the resulting ratios of long-term funds to fixed assets investments² are less than 100%, which should be compared with 142.3% in the United States. This suggests that Japanese businesses are under insufficient supply of long-term funds for their fixed asset investments, and use short-term funds as a substitute for long-term funds, the degree of this being stronger for smaller firms.

B. Substitution of Long-term Funds by Short-term Borrowings

This phenomenon of substitution of long-term funds by short-term funds is most clearly depicted by Table 2, which shows the shares of desired and realized financing of outside funds

TABLE 2. DESIRED AND REALIZED COMPOSITION OF CORPORATE FINANCING
FROM OUTSIDE BY SIZE OF BUSINESS (1968)

Scale of Business by Paid-in Capital	One billion yen and up		100 million yen one billion yen		50 million yen 100 million yen		10 million yen 50 million yen		10 million yen and down	
	realized	desired	realized	desired	realized	desired	realized	desired	realized	desired
Short-term Funds										
(1) Short-term borrowings	7.3	7.8	23.1	16.9	25.1	16.5	27.7	14.8	33.7	20.2
(2) Trade Credit	2.8	1.8	3.6	1.8	3.9	3.5	8.4	3.6	12.9	3.9
Long-term Funds										
(3) Long-term borrowings	73.7	73.0	61.0	67.8	55.0	64.1	47.7	64.8	35.4	53.9
(4) Issue of bonds	3.8	5.3	0.0	0.0	0.0	0.9	0.0	0.0	0.3	0.0
(5) Issue of stocks	7.2	9.3	3.1	8.3	2.2	9.1	4.2	10.6	2.2	10.7
No Answer	5.3	3.0	9.1	5.2	13.9	6.1	11.9	5.8	15.7	11.2
(7) Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0

Unit:

%

Source: Kinyu Seido Chosakai, *Kinyu Seido Chosakai Shiryo—Bekkan* 1970.

Note: (1) Result of questioning of 1,932 businesses by the Ministry of Finance.
(2) Each percentage is the share of number of businesses for which the most important source of financing (realized and actual) corresponds to each item.

by size of firms. From this, we can obtain the following findings:

(iii) For all scales of firms, realized shares of financing long-term outside funds are smaller than desired shares, while the inverse holds for short-term funds.

(iv) The difference between desired and realized shares widens as the firm size becomes smaller.

(v) Within short-term funds, the difference between realized and desired shares is greater in the short-term borrowings than in trade credit (except for the largest scale).

One additional piece of evidence concerning the substitution of long-term borrowings by

² This ratio is also lower for small firms than large firms, and the difference by scale in this ratio is smaller than that in θ , because smaller firms use more retained earnings as investment funds than large firms. It must be noted, however, that the dividend ratio for small firms is very low, and most of their profits are retained within the firms as a provision for future need for funds. This is also a consequence of limited access to long-term funds market.

short-term borrowings is obtained from Table 3:

- (vi) for financial intermediaries other than private long-term credit banks and trust banks, a considerable portion of short-term loans is rolled over into long-term loans.

On the other hand, although comprehensive proof is difficult, there are some reasons to believe that interest rates on long-term funds have been regulated at levels lower than competitive equilibrium. For example, the issue rate of corporate bonds has always been regulated by the government and is considerably (1–2%) below the market yield of previously-issued bonds. Also, the interest rates on long-term loans have been fixed at a preferential low level of loans to the electricity industry (10–15 years term), and there are no interest differentials by length of terms among long-term loans of more than a one year's term.

These considerations imply that in the corporate financing of post-war Japan, there has been considerable excess demand for long-term funds, the gap being filled mainly by short-term loans of financial intermediaries, and that the degree of excess demand and the use of short-term borrowings as substitutes are more significant, as the size of firms becomes smaller. Moreover, it must be recalled that the realized level of supply of long-term funds is insufficient for financing fixed assets investments. Therefore, we can say, in Japan, a significant portion of short-term borrowings is used to finance fixed assets investments, supplementing the shortage of long-term funds.

C. Credit Rationing in Long-term Funds Market

The difference in the degree of excess demand for long-term funds between small and large firms suggests the existence of credit rationing of long-term funds preferential to large firms. We will point out some evidence of this.

At first, let us take up the long-term loans of financial intermediaries. From Table 3, we can see that a major part of the loans of city and local banks are short-term, while those of private long-term banks and trust banks are long-term. On the other hand, Table 4 shows that loans of latter intermediaries are mainly supplied to large businesses. There are legal reasons for this. Trust banks are confined to lending only to "key" industries by the Trust Bank Act, and Section 7 of the Long-term Bank Act requires borrowers to be "safe",

TABLE 3. PERCENTAGE COMPOSITION OF LONG-TERM LOANS OF FINANCIAL INTERMEDIARIES (1965, 68)

Year	Composition of long-term loan in total loan excluding rollover credit (A)		Composition of long-term loan in total loan including rollover credit (B)		Composition of rollover credit to total loan (B) – (A)	
	1965	1968	1965	1968	1965	1968
(1) City banks	12.2	12.9	23.4	24.4	11.2	11.5
(2) Local banks	20.2	19.7	36.7	38.2	17.7	18.5
(3) Private long-term credit banks	91.7	88.9	91.7	89.4	0.0	0.5
(4) Trust banks						
Bank account	36.0	42.4	36.9	43.3	0.9	0.9
Trust account	99.5	99.8	99.5	99.8	0.0	0.0
(5) Mutual financing banks	40.1	38.8	47.3	43.8	7.2	5.0
(6) Credit associations	27.2	30.3	42.1	45.3	14.9	15.0

Source: Kinyu Seido Chosakai of the Ministry of Finance, *Kinyu Seido Chosakai Shiryo—Bekkan* 1970.

TABLE 4. COMPOSITION OF LOANS TO LARGE AND SMALL BUSINESSES
AND SHARE OF VARIOUS FINANCIAL INTERMEDIARIES (1965)

	Composition of loan			Share of loans in all financial intermediaries loans
	to large business	to small business	Total	
(1) City banks	76.3	23.7	100.0	35.8
(2) Local banks	46.7	53.3	100.0	18.0
(3) Private long-term credit banks	89.3	10.7	100.0	7.4
(4) Trust banks bank				
account	87.1	12.9	100.0	1.9
trade account	94.1	5.9	100.0	7.2
(5) Mutual financing banks	0.0	100.0	100.0	8.3
(6) Credit associations	0.0	100.0	100.0	7.9
(7) Others	63.2	36.8	100.0	13.9
(8) Total	—	—	—	99.9

Source: *Honpo Keizai Tokei*

Note: (1) Small (large) businesses are those with less (more) than 50 millions paid in capital.

(2) Others are composed of governmental financial intermediaries, insurance companies, and credit cooperatives.

virtually confining borrowers to large businesses. As Table 4 shows, the city and local banks lend both to small and large businesses, and share a large portion in total intermediary loans. The reason for their specialization in short-term loans is not simple. However, the regulation long-term interest rates at low level seems to be most responsible for this, since long-term loans are not profitable investments for banks. Therefore, we can say that long-term loans of financial intermediaries are rationed to large businesses through governmental regulations, legally or not.

As for the stock and bond market, governmental regulation is more explicit. There is a legal minimum size by equity capital for listing stocks (one billion yen for Section I and 300 million yen for Section II in the Tokyo stock market). Over-the-counter dealing is also confined to large businesses with more than 100 million yen equity capital. The issue of corporate bonds is allowed only to large firms with total assets more than 4 billion yen. Moreover, the rate of interest of new issue is stipulated by the government simply according to the size of firms.³

All these considerations seem to suggest that the allocation of long-term funds is strongly regulated by the government, legally or not, and rationed preferentially to large businesses.

II. *A Theory*

In this section, we will analyze a model of short-term bank loan markets, assuming the presence of governmental credit rationing in the long-term funds market.

A. *Supply Curve of Loan*

A representative i -th bank is supposed to maximize profit under the balance sheet constraint. Writing S_j for short-term loan to the j -th firm, k_j for the ratio of derivative deposit to loan, and neglecting reserve assets, security holdings and long-term loans and the like for the sake of simplicity, the balance sheet constraint is:

³ For a more detailed explanation for this credit rationing system of corporate bonds, refer to Hugh Patrick.

$$(1) \quad \Sigma S_j = H + k_j S_j$$

where H is primary deposit. We assume the cost (information cost, administration cost and cost of loan losses) of the loan to j -th firm is a function of the loan amount, $C_j(S_j)$ with

$$\frac{dC_j}{dS_j} > 0, \quad \frac{d^2C_j}{dS_j^2} < 0$$

Denoting ρ and r_j for deposit interest rate and the loan rate on j -th firm loan respectively, the profit of bank Γ is

$$(2) \quad \Gamma = \Sigma r_j S_j - \Sigma C_j(S_j) - \rho(H + \Sigma k_j S_j)$$

Maximizing (2) under (1), we can obtain the supply function of loan to j -th firm;

$$(3) \quad S_j = S_j(r_j)$$

It is easy to confirm that the function $S_j(r_j)$ has the following properties:

- (i) S_j increases as r_j increases.
- (ii) On $S_j = S_j(r_j)$, Γ increases as r_j increases.
- (iii) The slope of iso-profit curve is zero, positive and negative on, to the right of and to the left of $S_j = S_j(r_j)$ respectively.

The j -th firm (small or large firm), a representative client of the bank has a balance sheet identity.

$$(4) \quad (1 + \alpha) K_j = E_j + B_j + D_j$$

where K_j , E_j , B_j and D_j are fixed assets, equity, bonds plus long-term borrowing, and short-term borrowing, respectively. $\alpha (> 0)$ is a constant ratio of liquid assets to fixed assets. For the sake of simplicity, B_j and E_j are assumed to be constant.⁴ Operating profit after tax is assumed to be a function of total assets $(1 + \alpha) K_j$ and an index of business condition t , $R_j((1 + \alpha) K_j, t)$ with

$$\frac{\partial R_j}{\partial (1 + \alpha) K_j} > 0, \quad \frac{\partial^2 R_j}{\partial (1 + \alpha) K_j^2} < 0, \quad \frac{\partial^2 R_j}{\partial (1 + \alpha) K_j \partial t} > 0$$

Denoting q and r for the rates of interest on B and D , respectively, the profit of shareholders is

$$(5) \quad \Pi = R_j((1 + \alpha) K_j, t) - q_j B_j - r_j D_j$$

Maximization of (5) under (4) yields the j -th firm's demand function for short-term borrowing⁵ from

$$(6) \quad D_j = D_j(r_j, t)$$

It is also easy to confirm the following properties of this demand curve⁶:

- (i) D_j decreases as r_j increases.
- (ii) On $D_j = D_j(r_j, t)$, Π increases as r_j decreases.
- (iii) The slope of iso-profit curve is zero, negative and positive on, to the right and to

⁴ In terms of dual decision hypothesis of Robert Clower, this assumption means that on the first stage of decision making, notional demand for E and B is greater than the constant supply, so that E and B are assumed constant at the given level of market supply on the second stage of decision.

⁵ It is assumed that j -th firm finances short-term borrowing from only one bank. Refer to footnote 2 on page 28.

⁶ These properties of the demand function are a direct result of the properties of R function. Jaffee obtains the similar kind of demand function on the assumption of the increasing cost of alternative funds. In our model we cannot adopt Jaffee's assumption since alternative funds are rationed and constant for individual firms.

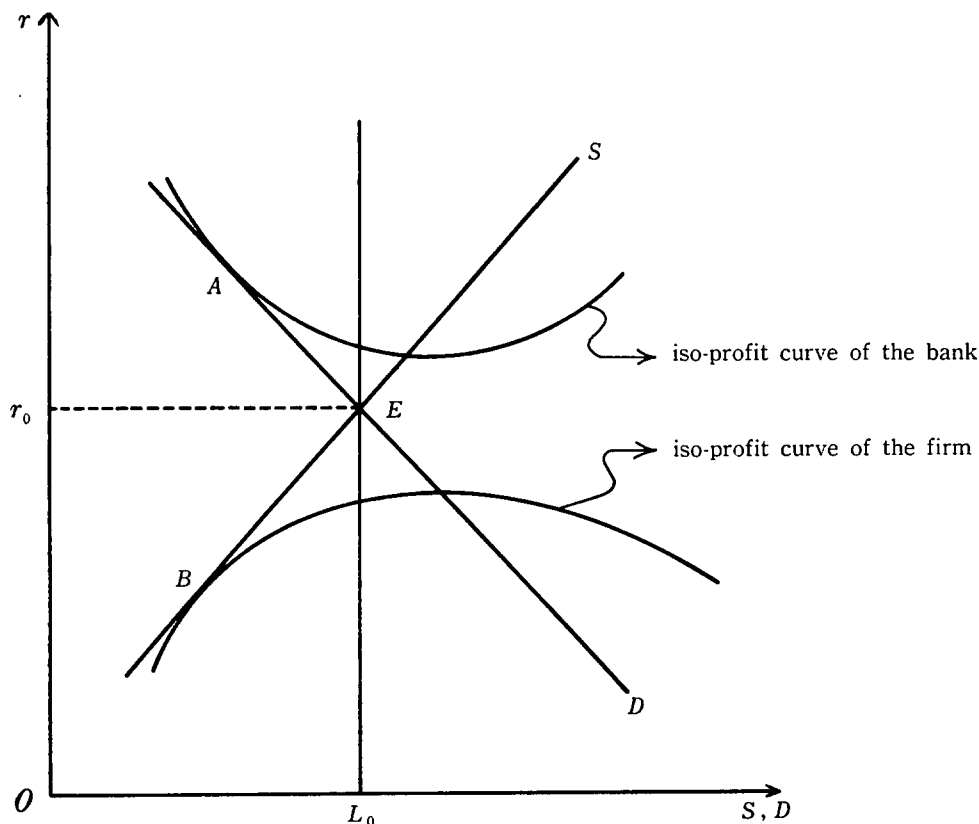
the left of $D_j = D_j(r_j, t)$ respectively.

(iv) D_j increases as t increases.

C. *Equilibrium in the Short-term Bank Loan Market*

As is well recognized, a bank loan market is a bilateral monopoly market, equilibrium being determined by the relative market power of individual bank and individual firm. Figure 1 depicts the situation of short-term loan market between j -th firm and i -th bank, where L_0 is a contract curve.⁷ As a polar case, if the market power of the bank is so strong that it behaves as a discriminating monopolist, equilibrium is attained at point A, where the bank's iso-profit curve is tangent to the demand curve of the business. As another polar case, if the business has strong market power and behaves as a monopsonist of bank

FIGURE 1. SHORT-TERM BANK LOAN MARKET BETWEEN j -TH FIRM AND i -TH BANK



⁷ The slope of iso-profit curve of bank is $\left(\frac{dC_j}{dS_j} \delta k_j - r_j\right)/S_j$, and that of firm is $\left(\frac{\partial^2 R_j}{\partial(1-\alpha)K_j^2} - r_j\right)/D_j$. Equality of these slopes means L is independent from r and constant. Since competitive equilibrium point is on the contract curve, we have $L=L_0$.

loan, equilibrium point is at B, where iso-profit curve of the business is tangent to the bank's offer curve. If the two transactors behave competitively, equilibrium point is on the L_0 curve, and if they maximize the sum of their profits jointly, equilibrium will be attained at E.

The fundamental assumption of our model is that market power between bank and business in the short-term bank loan market is an endogeneous variable and a function of relative access to long-term funds. In Japan, as is already shown, there is considerable unfilled demand in long-term funds market and the short-term bank loans are used as their substitutes. Moreover, since the supply of long-term funds is insufficient for financing fixed assets investments, a significant portion of fixed investment is financed by short-term bank loans. In a rapidly growing economy like postwar Japan, or more generally in the time of managerial capitalism, one of the main concerns of managers of businesses seems to be the expansion of firm size, and therefore the acquisition of investment funds. We consider that, in such a situation, lack of access to long-term funds increases urgency in the acquisition of their substitutes, short-term bank loans, and consequently, the market power of business in the short-term loan market becomes relatively weak. For this reason, we take θ (the ratio of long-term outside funds to fixed assets investments) as an index of relative access to the long-term funds market.

θ influences the market power in the short-term bank loan market in two ways. One is the determination of the position of transactors as a price-taker or a price-setter. When θ is large, as is the case for large businesses, it could be assumed either that business behaves as a price-setter and the bank as a price-taker or both behave competitively. When θ is small, as in the case of the small businesses, business becomes a price-taker and the bank a price-setter. The second influence of θ is on the markup ratio, defined as the difference between competitive equilibrium interest rate and interest rate determined in the bilateral monopoly situation. We assume the greater θ is, the higher the absolute value of markup ratio will be.⁸

Our model is as follows:

$$(7) \quad L = \begin{cases} D(r, t), \phi(\theta) > 0 & \dots \text{small businesses} \\ S(r) \text{ or } L_0, \phi(\theta) < 0 & \dots \text{large businesses} \end{cases}$$

$$(8) \quad (1 + \alpha)K = B + E + L$$

$$(9) \quad r - r_0 = \phi(\theta), \phi' > 0$$

$$(10) \quad \theta = (B + E)/K$$

$$(11) \quad D(r_0, t) = S(r_0) = L_0$$

Unknowns are L , r , r_0 , L_0 , θ and K . $\phi(\theta)$ is the markup ratio. r_0 is the interest rate in the competitive equilibrium. L_0 is the loan in the competitive equilibrium, and the contract curve, as well. L is the equilibrium loan amount, and (8) implies balance sheet identity (4) holds in the *ex post* equilibrium.

Since there is a considerable difference in the availability of long-term funds between large and small businesses, they have different market power in the short-term bank loan

⁸ As is seen from (6) and (8), these assumptions are synonymous to the simplest rule of equilibrium determination in a disequilibrium market; namely, equilibrium quantity is equal to the small amount of demand and supply for given price levels.

market,⁹ and consequently, the solution of the model is different.

In the case of a small firm, it behaves as a price-taker because its market power is weak due to relatively low value of θ . The banks can set interest rates in excess of r_0 according to the value¹⁰ of θ , and the equilibrium loan is determined equal to the loan demand of the firm at that interest rate. The solution in this case is given by

$$(12) \quad \begin{aligned} L^* &= D(r^*, t) \\ r^* &= \phi \left(\frac{(1+\alpha)(B+E)}{B+E+D(r^*, t)} \right) + r_0, \end{aligned}$$

together with (10) and (11).

As for the market power of a large firm, we have two alternative assumptions.¹¹ The first assumption is $L=S(r)$ in (7). This is an inverse to the case of a small firm, and the large firm is assumed to behave as a price-setter. The second assumption is $L=L_0$ in (7), and the bank and the large firm are assumed to behave competitively, yielding a Parato optimum solution. In either case, we assume $r < r_0$ because of relatively high θ value for large businesses. The solution when the large firm is a price-setter is given¹² as

$$(13) \quad \begin{aligned} L^* &= S(r^*) \\ r^* &= \phi \left(\frac{(1+\alpha)(B+E)}{B+E+S(r^*)} \right) + r_0, \end{aligned}$$

together with (10) and (11). The solution when the bank and the firm are competitive is

$$(13') \quad \begin{aligned} L^* &= L_0 \\ r^* &= \phi \left(\frac{(1+\alpha)(B+E)}{B+E+L_0} \right) + r_0, \end{aligned}$$

together with (10) and (11). Since the properties of the two solutions do not differ substantially, we will mainly examine (13) in the following analysis, leaving the examination of (13') to footnotes.

D. Comparative Statics

In order to test the empirical validity of our model with time series data, we will examine the effect of change in t (business conditions index) on equilibrium loans to small and large businesses. This subsection examines comparative statical properties of the model, and the next subsection infers cyclical movements of loans through introduction of simple lag structure in the change in markup ratio.

The results of comparative statics in the case of the small business are as follows:¹³

⁹ Along with the difference in θ , there is another important element which causes a difference in market power toward bank between large and small businesses. It is a difference in the number of available banks. The ratio of borrowing from the main lending bank to total borrowings is 48.6% for firms with less than one million yen total assets and 32.5% for firms with more than 10 million yen total assets (Teranishi and Patrick). Thus, smaller firms have a narrower range of access to various banks. Therefore, their market power toward a particular bank can be weaker to the extent that it is less easy for them than for larger firms to change their lenders.

¹⁰ Recall that as θ increases, ϕ decreases and r decreases, so that profit of the bank decreases, whereas profit of the firm increases.

¹¹ Koichi Hamada suggested our conclusion is basically the same under these two assumptions.

¹² For the existence of the solution (13), the following condition is necessary: $\phi' \frac{(1+\alpha)(B+E)}{(B+E+S)} \frac{dS}{dr} + 1 > 0$.

¹³ $\frac{\partial D}{\partial r^*} = \frac{\partial R}{\partial r_0}$ is assumed and $I = \phi' \frac{(1+\alpha)(B+E)}{(B+E+D)^2}$.

$$\begin{aligned}
 \frac{\partial r^*}{\partial t} &= \frac{-I^* \frac{\partial D}{\partial t} + \frac{\partial r_0}{\partial t}}{1 + I^* \frac{\partial D}{\partial t}} > 0 \\
 \frac{\partial L^*}{\partial t} &= \frac{\partial D}{\partial r^*} \frac{\partial r^*}{\partial t} + \frac{\partial D}{\partial t} = \frac{\frac{\partial D}{\partial t} + \frac{\partial r_t}{\partial t} \frac{\partial D}{\partial r^*}}{1 + I^* \frac{\partial D}{\partial r^*}} \\
 &= \frac{\frac{\partial D}{\partial t} \frac{dS}{dr_0}}{\left(1 + I^* \frac{\partial D}{\partial r^*}\right) \left(\frac{\partial D}{\partial r_0} - \frac{dS}{dr_0}\right)} > 0 \\
 \frac{\partial(r^* - r_0)}{\partial t} \left(= \frac{\partial \phi(\theta)}{\partial t}\right) &= \frac{\partial r^*}{\partial t} - \frac{\partial r_0}{\partial t} \\
 &= \frac{I^* \frac{\partial D}{\partial t} \frac{dS}{dr_0}}{\left(1 + I^* \frac{\partial D}{\partial r^*}\right) \left(\frac{\partial D}{\partial r_0} - \frac{dS}{dr_0}\right)} > 0
 \end{aligned}$$

Similarly, for the large business as a price-setter, the results¹⁴ are

$$\frac{\partial r^*}{\partial r} > 0, \quad \frac{\partial L^*}{\partial t} > 0, \quad \frac{\partial(r^* - r_0)}{\partial t} \left(= \frac{\partial \phi(\theta)}{\partial t}\right) > 0.$$

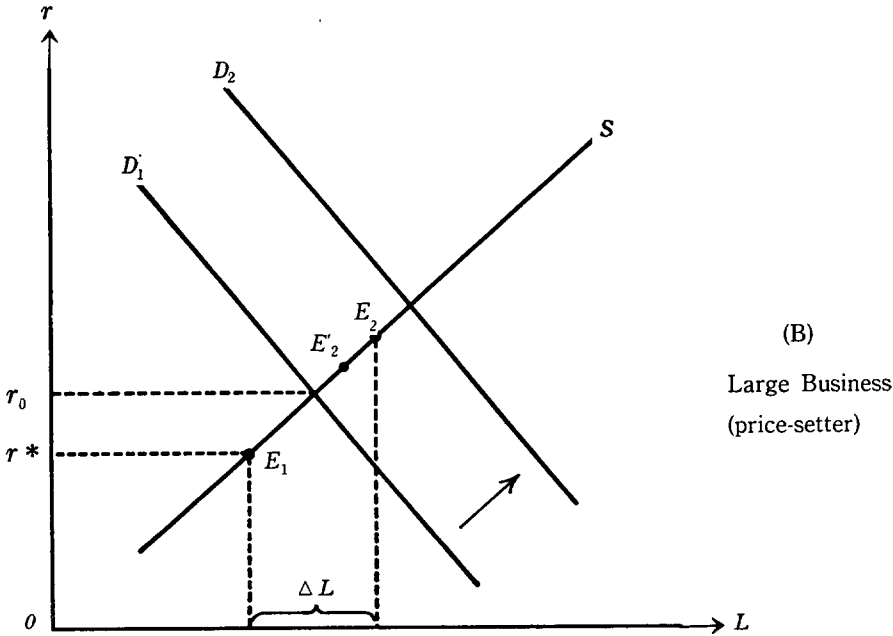
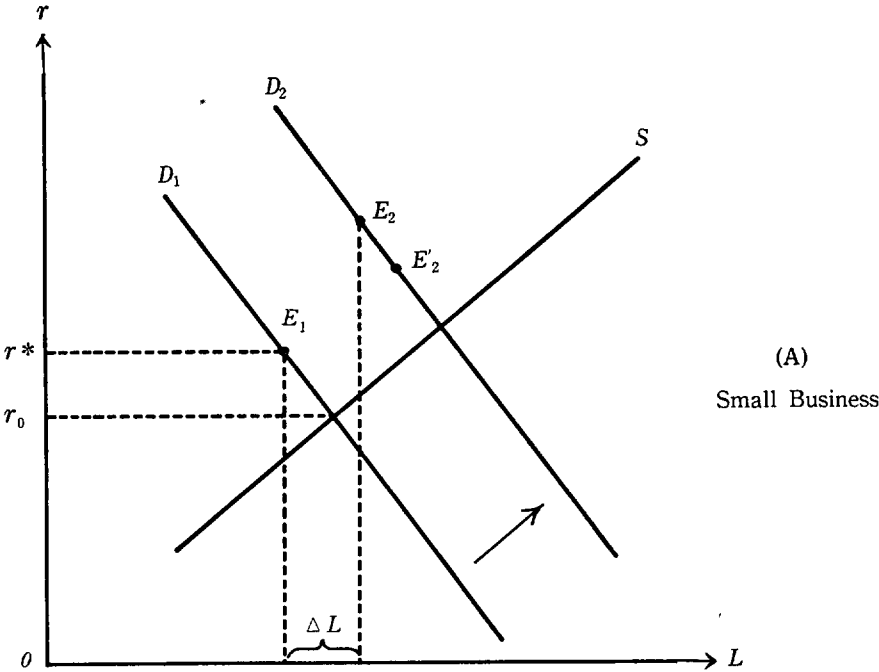
As a result of an increase in t (upswing of business conditions), the expected profit of businesses increases, causing a rightward shift of demand function for loans. Both the rate of interest and the loan amount are increased for the small business as well as the large business. However, there is a significant difference in the magnitude of range between the two businesses. Let us look at Figure 2. In the case of the small business, equilibrium moves from E_1 to E_2 in panel (A). Since the markup ratio is greater in E_2 than E_1 , E_2 is farther away from the competitive equilibrium. As a result, an increase in loan is smaller than is expected in the absence of a change in markup ratio. This is because an increase in short-term lowers θ and, consequently, the market power of the small firm toward the bank becomes weaker, enabling the bank to impose higher markup in setting the interest rate. A similar mechanism causes an inverse result in the case of the large business. An increase in θ lowers the negative markup in absolute value, and consequently a new equilibrium point comes closer to the competitive equilibrium. As panel (b) shows,¹⁵ the equilibrium point moves from E_1 to E_2 . At E_2 , the increase in loan is greater than at E_2' , which is a new equilibrium in the absence of the change in markup ratio. Needless to say, this change in markup ratio is a consequence of the decrease in a large firm's market power due to decrease in θ .

Similar arguments can be applied to the effect of decrease in t (downswing of business conditions). A decrease in t causes leftward shift of loan demand curves, lowering both

¹⁴ $\frac{dS}{dr^*} = \frac{dS}{dr}$ is assumed, and the necessary condition for existence of equilibrium in footnote 12 on page 34 is used in evaluating signs. Similar results are obtained for the case of the large business as a competitor of the bank.

¹⁵ In the case of the large firm competitive with the bank, a change in t affects only the interest rate, leaving the loan amount constant at L_0 .

FIGURE 2. EFFECT OF INCREASE IN t



interest rates and equilibrium loans. Because θ increases in this case, the market power of businesses become stronger, and it is easily confirmed that the absolute decrease in loan is smaller for the small business and greater for large business than is expected in the absence of the change in markup ratio.

E. *Dynamic Analysis*

Let us introduce a lag element into our model. We assume that the change in markup ratio occurs with a lag of one period, while shift of demand function due to change in t is instantaneous. This assumption seems to be plausible because the change in markup ratio is induced by the change in θ , whose changes occur through an increase in capital stock financed by short-term loans with long-term funds kept constant. Moreover, it could be argued that since markup ratio is determined through bargaining, it cannot be changed instantaneously.

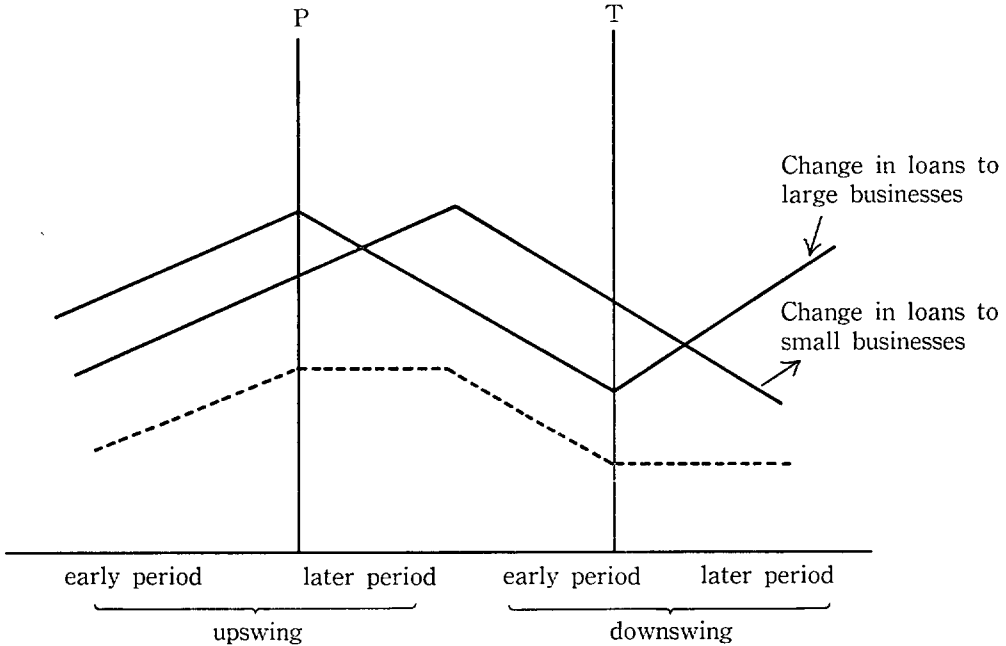
Under this assumption, the shift of equilibrium point in Figure 2 should be considered to be composed of the following two phases.¹⁶ The immediate effect of change in t moves equilibrium from E_1 to E_2' , which is a transitory equilibrium before the change in markup ratio. After some lapse of time, equilibrium then shifts from E_2' to E_2 , final equilibrium, through change in markup ratio.

Let us examine the effect of an increase in t (upswing of business conditions) in more detail. During the early period of upswing, the shift of demand curve moves equilibrium point from E_1 to E_2' . For the small firm, the loan increases considerably, and the loan to large firm increases less considerably. The interest rates are raised, but not yet significantly. Financed by this increase in short-term loans, capital stock increases. However, since the supply of long-term funds is not sufficient, the increase in capital decrease θ , which gradually changes the market power of business toward banks. In the later period of upswing, the change in market power is actualized, and the markup ratio begins to change. Thus, the equilibrium shifts from E_2' to E_2 . For the small business, the interest rate is further increased because the bank raises the markup ratio using the strengthened market power, and this rise in interest rate decreases the demand for loans by small firms, the degree of decrease depending on the interest rate elasticity of the demand curve. For the large business, weaker market power of the business results in a decrease in the absolute value of negative markup ratio. The interest rate further rises, and the bank increases the supply of large firm loan, the degree of increase depending on the interest elasticity of the supply curve. Therefore, during the later part of upswing, there is a remarkable contrast in the movements between loans to small and large businesses. The former turns from an increase to a decrease, while the latter continues to increase.

Similar arguments can be applied to the effect of decrease in t (downswing period). During the early period of downswing, a leftward shift of demand curve results in lower interest rates and a decrease in loan for both small and large firms. In the later period of downswing, however, the relative market power change and the loans to large firms further decrease, while the loans to small firms begin to increase. The reason for this is as follows. Owing to the depressed investment, the value of θ increases, and the market power of busi-

¹⁶ It seems to be possible to construct a difference equation model for the following dynamic analysis. However, logic of the following inference is so simple that it is unnecessary to complicate the matter using an explicit mathematical model.

FIGURE 3. CYCLICAL MOVEMENTS OF LOANS TO SMALL AND LARGE BUSINESSES



ness is strengthened. Therefore, the bank is obliged to lower the markup ratio, and the demand for loans by small firms increases under the lowered interest rate. On the other hand, the large firms become able to raise the absolute value of negative markup ratio, thereby increasing their profit.

The result of this inference¹⁷ is diagrammed in Figure 3. The abscissa is time and the ordinates are the change in loan. *P* and *T* show the peak and trough of the business cycle, respectively. The level of curves is not rigorous since it depends on the magnitude of shift and slope of demand curves. The dotted curve shows the change in loan for the large firm competitive with the bank.

III. Empirical Analysis

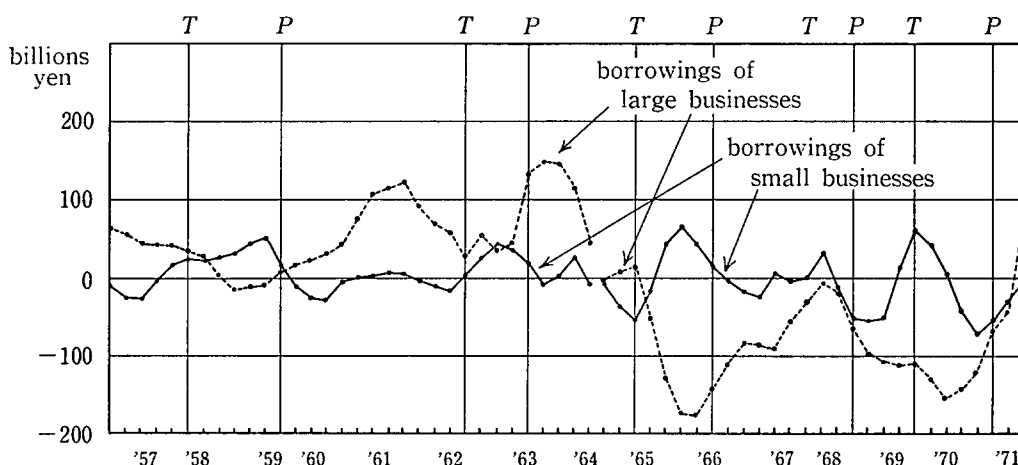
The theoretical analysis in the former section implies a remarkable contrast in changing patterns of short-term borrowings between small and large businesses. As Figure 3 shows, borrowings of small businesses begin to decrease right after the peak of a boom and begin to increase from the bottom of a slump, while borrowings of large businesses increase throughout a boom period and decrease throughout a slump period.¹⁸

¹⁷ This figure is derived on the assumption of one period lag of the change in markup ratio, which is half of the length between *P* and *T*. This, needless to say, is a simplifying assumption. Incidentally, we can also derive a similar figure for the changing patterns of interest rates. However, there is no difference between small and large firms, except for the level of interest rates.

¹⁸ This countercyclical availability of credit for small businesses is quite similar to that for residential construction in the United States. On this point, refer to William W. Alberts and Sherman Maisel.

Actual movements of short-term borrowings by firm size are shown in Figure 4.¹⁹ Their cycles are quite similar to that of Figure 3 at least up to around 1967. This correspondence of cyclical patterns between theoretical inference and empirical evidence seems to be a strong support for our model. The findings in Figure 4, difference in cycles of short-term loans between small and large businesses, is by no means new. It was originally found by Miyoei Shinohara and extensively analysed by Hiroshi Kawaguchi. Their explanation of this

FIGURE 4. CYCLICAL MOVEMENTS OF SHORT-TERM BORROWINGS OF SMALL AND LARGE BUSINESSES
(Four-period Moving Average Series of Quarterly Changes in Borrowings Adjusted for Trend Increase)



Source: Okurasho, *Hojin Kigyo Tokei Kiho*, and Bank of Japan, *Keizai Kansoku Kiso Tokei*.

Note: (1) Large (small) businesses are those with more (less) than 10 millions yen paid-in capital before 1964 and more (less) than 100 millions yen paid-in capital after 1965.
(2) Trend effects are eliminated by subtracting estimates of following regressions applied to the four-period moving average series from the actual moving average series.

Small businesses with less than 10 millions yen paid-in capital

$$\ln(\Delta L + 10) = 5.802 + 0.051t; R^2 = 0.72$$

(36.44) (13.41)

Large businesses with more than 10 millions yen paid-in capital

$$\ln(\Delta L + 160) = 5.419 + 0.025t; R^2 = 0.29$$

(29.09) (5.53)

Small businesses with less than 100 millions yen paid-in capital

$$\ln(\Delta L + 220) = 5.837 + 0.045t; R^2 = 0.59$$

(31.33) (10.21)

Large businesses with more than 100 millions yen paid-in capital

$$\ln(\Delta O + 110) = 5.398 + 0.044t; R^2 = 0.70$$

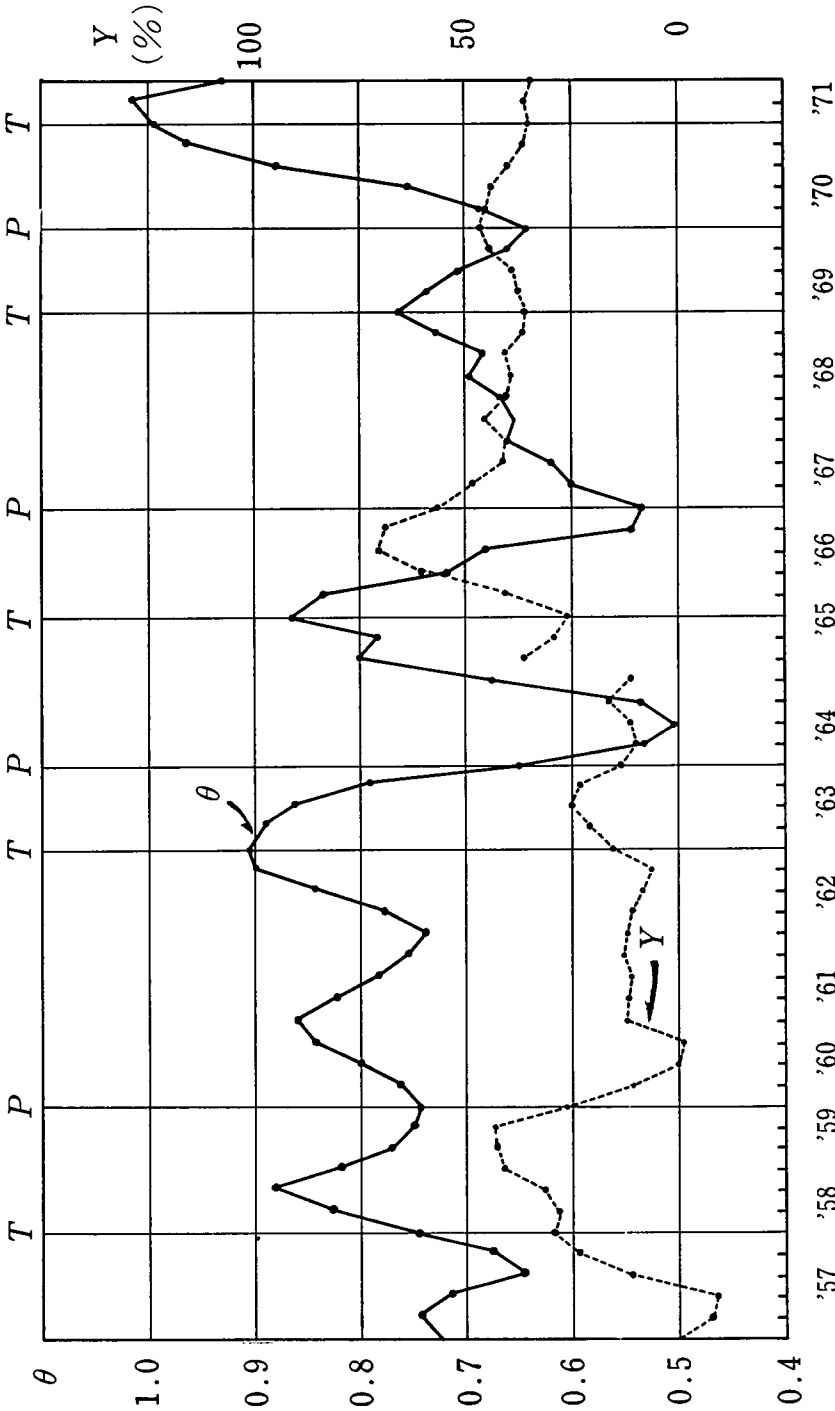
(35.46) (12.04)

L is four-period moving average of quarterly changes in short term borrowings. t is time. Figures in parentheses are t values. Figures in regressand are added to avoid negative antilogarithm values.

(3) P and T are peak and trough respectively, of the month-to-month one year before changes series of industrial production index (the Bank of Japan).

¹⁹ Shinohara and Kawaguchi call this cyclical pattern "dualism in credit cycle". Similar cycles can be obtained in the examination of loans of city and local banks, because their loans are mainly short-term (Table 3). Refer to Kawaguchi.

FIGURE 5. SHARE OF SMALL BUSINESSES IN SHORT-TERM BORROWINGS (Y) AND RATIO OF LONG-TERM OUTSIDE FUNDS TO FIXED ASSETS INVESTMENTS (θ) OF ALL BUSINESSES



Source: Okurasho, *Hojin Kigyo Tokei Kiho*.

Note:

- (1) Definitions of small and large businesses are the same as Figure 5.
- (2) All variables are quarterly flow and four-period moving averages before calculating shares and ratios.
- (3) Y is quarterly changes in short-term borrowings of small businesses divided by quarterly changes in short-term borrowings of all businesses.
- (4) θ is quarterly changes in long term fixed assets of all businesses divided by changes in fixed assets of all businesses.

TABLE 5. CORRELATION COEFFICIENT BETWEEN SHARE OF SMALL BUSINESSES IN SHORT-TERM BORROWINGS (Y_t) AND RATIO OF LONG-TERM OUTSIDE FUNDS TO FIXED ASSETS INVESTMENTS (θ_t)

	Y_t	
	1957-64	1965-71
θ_t	0.14	0.16
θ_{t-1}	0.19	0.11
θ_{t-2}	0.31	0.00
θ_{t-3}	0.12	-0.18
θ_{t-4}	-0.21	-5.52
θ_{t-5}	-0.59	-0.35
θ_{t-6}	-0.78	-0.19
θ_{t-7}	-0.70	0.06
θ_{t-8}	-0.39	0.23

Source and Note: The same as Figure 5.

phenomenon is as follows. During a boom period, loans of financial intermediaries are preferentially supplied to large businesses due to the tie-up relationship between banks and large businesses. Since the loan demand of large businesses accelerates around the peak of the boom, financial intermediaries increase large business loans at the sacrifice of a decrease in small business loans. During a slump period, the loan demand of large businesses is depressed, and financial intermediaries try to use their surplus funds in small business loans. Thus, small businesses can obtain enough funds only at the bottom of a slump when large businesses do not want to borrow.

This explanation is certainly in accordance with the cyclical phenomena in Figure 4. However, it must be noted that their logic is essentially dependent on the notion of a tie-up relationship between banks and large businesses, on which neither concrete definition nor analysis is provided. On the other hand, our model in the former section treats the relative market power between bank and business as an endogenous variable, which is a function of the degree of governmental rationing of long-term funds.

According to our theory, there should be a lagged relationship between short-term loans to small and large businesses and the ratio of long-term outside funds to fixed assets investments. This is examined in Figure 5. Y is the share of small business in total short-term borrowings. It decreases around P and increases around T , as is readily conjectured from Figure 4. θ also shows a clear cyclical pattern,²⁰ low around P and high around T . Y and θ seem to correlate negatively with a lag of 4 or 6 quarters (Table 5). Simple regressions of Y on lagged θ are as follows.

$$Y_t = 70.75 - 0.66 \theta_{t-5} + 19.70 X_t; \quad R^2 = 0.64$$

$$(4.65) \quad (-3.47) \quad (5.49)$$

X_t is a dummy variable with 1 for 1965-71 and 0 for 1957-64, introduced because of the difference in the definition of small and large businesses between two periods. Figures in parentheses are t values. Estimated lag of 4 or 6 quarters seems to be rather longer than is assumed in the theory. In the theory, we have assumed one period lag, which is conveniently supposed to be half of the length between T and P in the derivation of Figure 3. Average

²⁰ θ in Figure 5 is for all businesses. We have also checked movements of θ of small and large businesses separately. They show quite a similar cyclical pattern as θ of all businesses, except for the difference of level (of course, θ of large businesses is much higher than that of small businesses).

length between T and P is 6.5 quarters during 1957–71, suggesting a 3.25 quarters lag. However, this does not seem to invalidate our theory, since one period difference model *per se* is a simplified presentation of our hypothesis.

It is desirable to test our model with respect to movements of interest rates on loans. However, there are no reliable data on loan interest rates in postwar Japan. This is because there is a widely prevailing custom of compensating deposit, on which no exact data are available.²¹ Moreover, our theory does not suggest any difference in the movements of interest rates on small and large businesses loans, except for possible difference in level of interest rates.²² Juro Teranishi and Hugh Patrick present some evidence on the wide difference in the loan interest rates between small and large businesses.

IV. *Concluding Remarks*

Our model classifies financial markets of postwar Japan into two categories. One is the long-term funds markets²³ which are directly regulated by the government, and the credit in these markets is preferentially supplied to large businesses. The other is the short-term banks loan market which is unregulated and on which Japanese businesses are heavily dependent for investment funds. We have shown that there is a strong and systematic effect of the disequilibrium in the regulated market on the unregulated market. Under our hypothesis, short-term credit is also preferentially supplied to large businesses especially in upswing periods owing to the difference in access to long-term funds between small and large businesses.

The present theory of the short-term bank loan market owes much to and is quite similar to the credit rationing model of Jaffee and Modigliani, except for the following major differences. First, while their model derives an upswing sloping (and backward bending) loan supply curve from the stochastic business return and the concomitant default risk, the upward slope of our supply curve is simply a result of concave cost function of the bank. Second, their model supposes that the bank behaves as a discriminating monopolist to business and this relationship is fixed, whereas we have assumed an endogenous and wider range of market power between bank and business. The importance of specification of various market power between bank and business is already emphasized by Jaffee. Our contribution, therefore, lies in treating market power as an endogenous variable. As for the idea of cyclical variation of market power, we can trace back to the idea of endogenous degree of monopoly of Michael Kalecki. Third, the most important difference lies in the assumption about interest rate flexibility. In the Jaffee-Modigliani model, the imposition of a common rate to a class of customers and its temporal rigidity due to oligopolistic banking structure play a crucial role

²¹ Denoting L , D , r and i for amount of loan, compensating deposit, stated loan rate and rate of interest on compensating deposit. The effective loan rate is $(rL - iD)/(L - D)$ and is greater than r . Data on L , r and i is available, while those on D are not. In Japan, compensating deposit is usually held in the form of time deposit.

²² In our model, the rate of interest on small business loan is normally higher than that on large business loan for two reasons. One is possible higher cost of loan ($C_f(S_f)$) due to higher risk and higher administrative cost. The other is the positive markup ratio ($\phi(\theta)$) as compared to the negative one a large business.

²³ Deposits market is another important regulated market. The rate of interest on deposits has been regulated at a disequilibriumly low level. Although we do not touch upon this market in this paper, this regulation has caused lots of problems, especially with respect to the banking structure and distributional aspects.

for credit rationing. However, in our model, the interest rates are supposed to be sufficiently flexible (except for long-term funds rates), and a phenomenon which is seemingly a result of credit rationing due to rigid interest rates is explained without resorting to the rigidity of interest rates.

In postwar Japan, there are many arguments about dualism between large and small businesses. Dualism in this context can be defined as the difference in wage-rental ratio between large and small businesses larger than which can be explained in a perfect competition model.²⁴ In the investigation into the extent and source of dualism, the major difficulty on the financial side has been a lack of reliable data on loan interest rate by firm size, due to the prevalence of the custom of compensating deposits.

However, if one can construct a model which explicitly assumes imperfection in financial markets and prove the empirical validity of the model with respect to the loan amount on which precise data is available, it follows that one can indirectly show the existence and the source of such dualism. The present model seems to serve such a purpose. A tentative conclusion in this regard is that the government regulation on the long-term funds market causes imperfection in the short-term funds market, and, to that extent, is responsible for dualism in the post-war Japanese economy.

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²⁴ Teranishi and Patrick.